

MURPHY (J.B.)

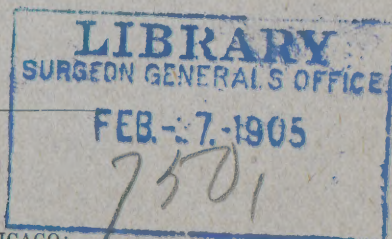
ILEUS.

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ILEUS.

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The subject of intestinal obstruction has always been one of great interest and will continue so until our methods and results in diagnosis are greatly advanced. Before entering into the details of the subject, let us take a view of the mechanism of the intestinal tract from the pylorus to the sphincter ani. We have here a long muscular tube of varying size with natural constrictions in certain positions, either from *a*, a special muscular development (sphincters), or *b*, from abrupt changes in the course of the canal (flexures), or *c*, from gradual diminution in the size of the canal, as of the lower end of the ileum. This canal has, besides its physiological functions those of secreting, absorbing and excreting, the power of propelling its contents by its own muscular contraction. It can readily be seen that a fecal stasis could be produced:

1. By the absence of muscular contraction—paralysis. This paralysis may be of spinal origin, may originate in the afferent nerve, or there may be a local paralysis, as from infection at the terminal filaments.

2. From tonic contraction, as from mineral poisonings, lead and from certain ptomaine poisoning, as tyrotoxon.

3. It may result from mechanical causes, as constriction in the calibre, bending at a sharp angle, occlusion by a foreign body, as a gall-stone or a neoplasm; compression from without, etc.

With this short consideration of the mechanism of obstruction we will take up the subject of ileus in

general. By the term ileus is meant not a definite pathologic entity, but a complexus of symptoms produced by very different causes. The characteristic symptoms of ileus are abdominal pain, inability to produce bowel movement, vomiting and meteorismus (tympanites). These symptoms may be produced by adynamic, dynamic or mechanical causes. We have therefore adynamic, dynamic and mechanic ileus.

SCHEME.

Ileus.	{	Adynamic Ileus..	{	1. Operations on mesentery.
				2. Prolonged strangulation.
				3. Spinal.
				4. Afferent nerve lesion.
			{	5. Reflex {
				1. Strangulated omentum.
				2. Hepatic calculus.
				3. Renal calculus.
			{	4. Ovarian compression.
				6. Septic. {
				1. Local peritonitis.
				2. General peritonitis.
			{	3. Embolism
				4. Thrombo phlebitis.
				7. Uremic.
		Dynamic Ileus..	{	Lead poisoning, chronic.
				Tyrotaxon poisoning.
			{	External. {
				Inguinal.
				Femoral.
				Umbilical.
			{	Ventral.
		Mechanic Ileus..	{	Peritoneal pockets.
				Diaphragmatic hernia.
				Inguinal hernia.
				Umbilical hernia.
			{	Adhesive bands.
				Diverticula.
				Internal. {
				Volvulus.
			{	Intussusception.
				Neoplasms { Internal
				External.
				Cicatricial contraction.
			{	Fecal impaction.
				Foreign bodies (enterolith).

ADYNAMIC ILEUS

Is always the result of paralysis of a larger or smaller portion of the intestine from the following causes:

1. Paralysis from extensive operations on the mesentery, disturbing its circulation.

2. Paralysis of a loop returned after prolonged strangulation, particularly from femoral hernia.

3. Injuries to the spinal cord, as fractures, bullet wounds and punctures.

4. Injury to the afferent nerve.

5. Reflex paralysis, as that produced by the passage of gall-stones into the ducts, renal calculi, strangulated omentum or compression of an ovary.

6. Septic paralysis from peritonitis, cholecystitis, salpyngitis, embolism of mesenteric artery, etc.

In the first class, where extensive operations have been performed on the mesentery for the removal of tumors, the repair of lacerations, etc., there is always danger of paralysis and gangrene of the dependent

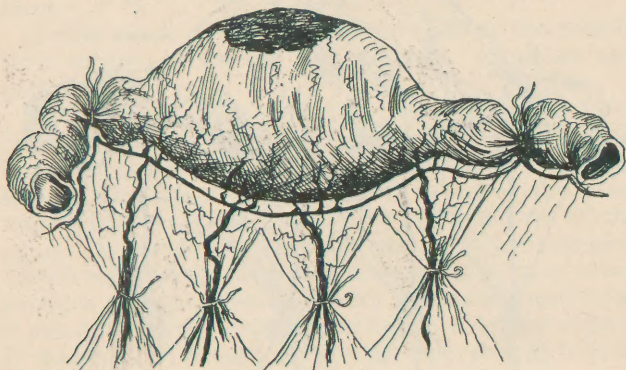


Fig. I

coil as a result. I have endeavored to determine by experiment to what extent we are permitted to resect or destroy the circulation in the mesentery, without endangering the bowel, with the following results:

Experiment 1.—Large dog; aseptic laparotomy; ligation of the mesenteric vessels supplying three inches of the intestinal tract, after having emptied the intestine and ligated it so as to occlude its calibre, being careful not to include the parallel artery of the bowel; abdomen closed. Examination forty-eight hours later showed the intestine in good condition. The same experiment was repeated, and it was found that when a greater segment than six and one-half inches was included in the ligatures, gangrene took place on the convex side of the seg-

ment near its center (Fig. 1). This shows that the parallel vessel will supply the intestine with sufficient blood to retain its vitality for forty-eight hours, even though the mesenteric supply were completely shut off for that length of time.

Experiment 2.—Ligation of the mesenteric vessels and the parallel vessels of the bowel, without closing the caliber of the bowel, could be made to the extent of one-half inch. When more than this was included gangrene ensued.

The following is of interest:

Experiment 3.—Dog; aseptic laparotomy; mesenteric vessels ligated, supplying a segment of seven inches; segment emptied; parallel vessel and intestine ligated (Fig. 2). Dog

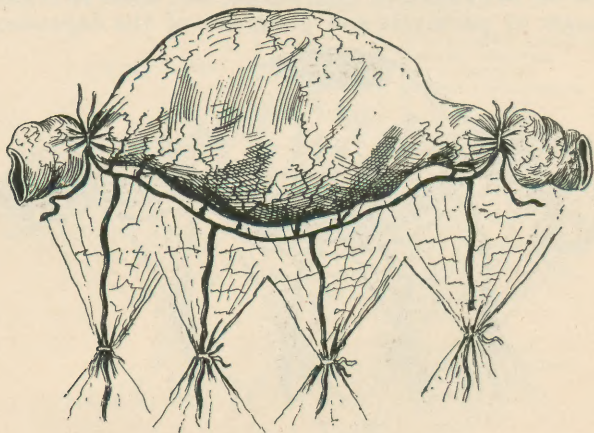


Fig II

died forty-one hours after operation. Post-mortem: The ligatures around the intestine were still in position, the contents had not escaped. The segment resembled a blood clot, and all evidences of organized tissue had disappeared (Fig. 3). The disintegration was so complete that I can not attribute it to any other cause than auto-digestion. The peritoneum was universally denuded of its endothelium and the cavity contained a considerable quantity of blood.

It is shown by these experiments that the parallel artery must be given the greatest consideration in operating on the bowel and mesentery. When it is injured, as by a bullet or in an operation, resection

should be made of that portion from which its blood supply is cut off.

Ileus following the return of a bowel that has been strangulated for a considerable time, and particularly the severe strangulation of femoral hernia, is due to thrombosis of the veins, a local paresis or ischemia from the occlusion of the parallel artery, and not infrequently causes a fatal termination in cases where appearances promised a restoration to the function of the bowel when returned. This form of ileus must not be confounded, however, with that following reduction of hernia *en bloc*, which will be considered later.

A rare cause of ileus is an embolism of the mesenteric artery, producing an ischemia, paralysis and gangrene.

Pathologic lesions and injuries of the spine, as fractures, produce a paralysis of the intestine, followed by great meteorismus, which may continue for several days after the injury. It is one of the most unpleasant complications following fractures of the spine. The abdomen becomes enormously distended; interferes greatly with respiration, and may even produce prolapsus recti. Under favorable conditions it subsides on the fourth or fifth day after the injury. It may also be caused by spinal hemorrhage following traumatism without fracture.

The following case illustrates:

Male, age 32, brought to Cook County Hospital; history given as follows: In a quarrel a few hours previous patient was shot in the neck from the front; immediately following the discharge of the gun, he fell to the floor paralyzed and remained so, though he was quite conscious. Examination: A small bullet wound just outside the cervical vessels and an inch below the angle of the jaw; there was no wound of exit; the paralysis of all the extremities was complete and he was aphasic; thirty-six hours after he became unconscious; his respiration was purely diaphragmatic; his abdomen became enormously distended and peristalsis was absent; priapism was marked. These symptoms continued until the end of the fourth day when he succumbed. Diagnosis: Penetrating bullet wound of cervical portion of spinal cord. Post-mortem

showed the spinal canal full of blood extending its entire length and compressing the cord. The tympanitis in this was extreme. I firmly believe an operation would have saved this man, as death was caused by compression of the cord with blood.

Injury to the afferent nerve supply, as a blow upon the epigastrium, may produce a paralysis and all the manifestations of obstruction; a bullet wound in the mediastinum may have the same effect, as is illustrated in the following case, which occurred during my service at Cook County Hospital in the spring of 1890:

A police officer was pursuing a burglar upstairs when the latter turned and fired downward. The bullet passed into the

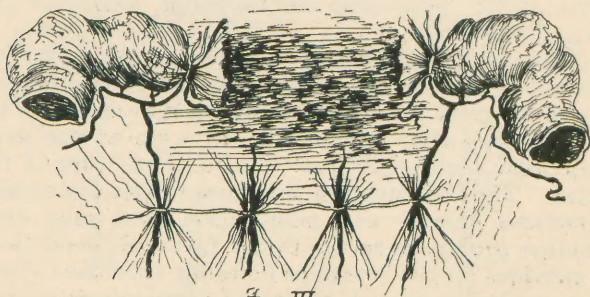


Fig III

mediastinum at the right sterno-clavicular junction. There was no evidence of injury to the lung, large blood-vessels nor stomach, but the patient gradually developed the symptoms of ileus; pain in the abdomen, not severe; slight tenderness; vomiting persistent; enormous distension of the abdomen; complete absence of peristalsis; inability to produce bowel movement. These symptoms continued for seven days; patient's pulse was then 140; temperature 99°; respiration 46; facial expression bad, and death seemed imminent. Diagnosis: Perforative peritonitis. Laparotomy. The intestines enormously distended, but not congested in the least; no inflammation at any place in the peritoneum; a small quantity of transuded serous fluid was present in the most dependent portion of the cavity. The fluid contents of the bowel gravitated with alteration of position and explained the cause of the change in the location of dullness noticed before operation, viz., that dullness was present always in the dependent por-

tion of the abdomen, but the operation showed it was not due to free fluid *in the cavity*, but to fluid that gravitated to the dependent portion of the intestine on account of the complete paralysis. The abdomen was closed. The stimulation of the operation produced an active peristalsis, which was soon followed by the passage of gas and feces; vomiting ceased, pulse improved, facial expression changed, and the patient made a rapid and uneventful convalescence. This is a typical case of ileus from afferent nerve paralysis.

Reflex ileus may be produced by: *a*, Strangulation of omentum; *b*, gall stone obstruction in the cystic or common duct; *c*, impaction of renal calculus in ureter, and *d*, by compression of an ovary.

In strangulated omentum the symptoms of ileus are very pronounced and continue for a considerable time in the early stages, and it is difficult to make a differential diagnosis between it and mechanical obstruction of the intestine.

In obstructions to the cystic or common duct the symptoms of ileus are also pronounced and continuous. I have in the last two years seen three cases in which the patients were prepared for laparotomy for intestinal obstruction where this condition existed in the cystic duct. Ileus from renal calculus is of shorter duration than the other varieties mentioned.

Occasionally an ovary is compressed between the bony wall of the pelvis and a fibroid or other tumor, producing the symptoms of ileus, which continue with greater or lesser severity until the ovary is released.

Ileus from sepsis or infection ileus: *a*, peritonitis general; *b*, peritonitis local. The peritonitis may be of chemical or bacterial origin. An infection of the peritoneum can occur from a perforation, through impaired resistance of the wall, as an ulcer in the appendix or intestine, through a diseased tube or gall bladder, or from a suppuration contiguous to it. We have in the peritoneum as a result of this infection either an acute, rapidly destructive type, where the symptoms of obstruction are pronounced at the onset and continue until a few hours before death, when

relaxation takes place and there are frequent fluid bowel discharges. This is characteristic of peritonitis, and does not occur in mechanical obstruction. The post-mortems show the peritoneum red, denuded of its endothelium, with but a small quantity of exudate and no flakes nor pockets of pus. There are multiple capillary hemorrhages, the gloss is absent and bowel greatly distended. This is the variety which occurred very frequently after operations in the peritoneal cavity in the pre-antiseptic period, but now, fortunately, it is very rare.

In the subacute and circumscribed inflammations of the peritoneum the symptoms of ileus are less pronounced and pass away in about forty-eight hours after the onset of the attack. In these cases the laparotomies and post-mortems show the bowel covered with a fibro-purulent exudate, many adhesions and often circumscribed accumulations of pus. The more acute the attack the more the pathologic phenomena manifest themselves. The infiltration of the intestinal wall produces a paralysis of peristalsis, and the more virulent the poison the more complete and lasting the paralysis.

Uremic ileus.—In one of the varied forms of uremic manifestations—the intestinal variety—we have symptoms very clearly resembling those of mechanical intestinal obstruction. The physical signs of intestinal obstruction, as increased peristalsis, tympanites, circumscribed areas of dullness are absent, while the vomiting and inability to produce bowel movements are persistent. No other uremic symptoms may be present to suggest the diagnosis, but an examination of the urine demonstrates organic disease of the kidneys. It must be remembered that intestinal obstruction can occur in an uremic and, on the other hand, that a small percentage of albumin is often present in mechanic ileus.

DYNAMIC ILEUS

is produced by a tonic contraction of the circular

muscular fibers of the bowel. This contraction may continue for days. It may be caused by poisoning with lead, tyrotoxicon, etc.

MECHANIC ILEUS

or mechanic obstruction: 1, Strangulation of intestine, internal and external (hernia); 2, invagination; 3, obturation, internal (neoplasms, volvulus) and external (incarcerated hernia).

1. By strangulated ileus we mean that not only is the intestinal tract impermeable to its contents, but that the circulation is impeded or suppressed, the nutrition of the coil is shut off and its necrosis is imminent. The mesenteric vessels are the first to yield to the pressure, but the parallel vessel keeps up the blood supply for a long time after, as it is so thoroughly protected against pressure by its position. (Fig. 4 and 5.) In the first variety we have strangulated hernia, inguinal, femoral, umbilical and internal strangulation by diverticula, pseudo ligaments, adherent appendix vermiformis, appendix epiploica, adherent omentum, etc.; strangulations through openings in the omentum and mesentery, retention in peritoneal pockets, or by a twisting of intestine on its axis (volvulus). All of these conditions can produce complete strangulation and necrosis. The danger is great and they run their course rapidly.

2. Invagination holds a middle place between strangulation and obturation, as well for the severity of its symptoms as the tendency to local necrosis and danger to the life of the patient. The symptoms are, as a rule, less pronounced, but of longer duration. Often the invaginated portion may escape necrosis, and should it become necrotic, may slough off and pass through the bowel without causing death. In obturation ileus the symptoms come on slower, the local destruction is more gradual and the danger to life is more distant, depending upon the degree of obstruction and the cause, whether it be simple contraction of the lumen of the bowel, a gradual compression

of its caliber by an occlusion from within, an occlusion by a foreign body, as a gall stone, an intestinal fibroma or polypus, a gradual filling and compression from carcinoma or sharp bending of the canal.

Ileus from tonic contraction of the circular muscular fibers of the intestinal wall may produce obstruction with all its concomitant symptoms, lasting for many days.

After this short review of the pathologic conditions we will take up the diagnosis.

Diagnosis.—Can we differentiate with any degree of certainty at the bedside between the various forms of ileus, or between the various groups? This can safely be answered in the affirmative. When we

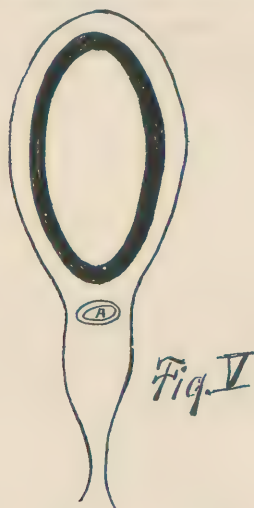


consider that the complexus of symptoms included under the term ileus occurs under so many distinct and different pathologic conditions, it is easily understood why the practice of physicians differs; why the statistics of various men differ; why one class of doctors finds that 100 per cent. of the cases of ileus not operated die, and that another class finds that 34 per cent. of them recover without operation. The reason for these apparent discrepancies is that different pathologic conditions are included under the name of ileus by the various observers.

We will now endeavor to draw attention to the history, the etiology and the clinical course of ileus.

The history will assist us greatly, indeed, if not

assure us of a diagnosis of intestinal paralysis following operations on the mesentery, the return of a long strangulated hernia, injuries to the spinal cord, injuries to the afferent nerve supply and strangulated hernia and aids us somewhat in making a diagnosis of thrombosis and embolism of the mesenteric vessels. In the reflex paralysis, gall stone colic with or without jaundice, or renal colic, the history of previous attacks aids in the diagnosis. The history is of less value in the inflammatory and me-



chanical varieties. Here the clinic course, symptoms and signs, will have to be relied upon. The abdominal pain is recognized as a manifestation of irritation of the terminal nerve filaments of the peritoneum, and will vary in intensity, continuity and locality, depending upon the lesion present. Inability to produce bowel movement has already been explained and may be due to many causes, which will be given in detail in reference to the different groups.

Of the explanations of the mechanism of vomiting,

and particularly the fecal vomiting, that have been given, the two most important are the following: 1, that it is due to reversion of peristalsis; 2, that it is due to an overflowing of the accumulations on the proximal side of the obstruction; the increase in quantity is due to decomposition of the contents and transudation from the irritated mucous surface. Schlange has given his support to the latter theory, but it is not the only cause, for in attacks produced by gall stone and renal calculus we have no occlusion of the bowel, nor accumulation on the proximal side to produce an overflowing; still the vomiting is often very persistent, and it is my belief that here a reflex cause is the most potent factor in producing vomiting. Fecal vomiting, when it occurs, always comes from a mechanic obstruction of the intestine, but it has no definite relation to the position or nature of the obstruction. In the literature on the subject we find records of cases where formed feces were vomited. The accurateness of this observation I question. It is a rare occurrence to find material vomited which has the distinct odor of feces. There is an odor different from the fecal, that of decomposition of the intestinal contents which occurs in intestinal obstruction. I have seen but two cases in which a distinct fecal odor was present, and both were obstructions of descending colon. Formed feces could come only from the large intestine, and I believe this has never occurred. The material which has been considered formed feces, is mostly a caseous material, curdled milk which has received its color and odor in the stomach from the regurgitated contents of the intestine.

Meteorismus occurs in three places in the intestine: Above the seat of obstruction, in the occluded loop, or in the paralyzed portion—the latter may be that coil or the entire intestinal tract. The contents of the distended intestine differ materially in the three different conditions. With mechanic occlusion on the proximal side in close proximity to the

obstruction the intestine is usually full of liquid feces, principally transudation from the mucosa. With strangulation or occlusion of a coil it is distended about one-third with gas and two-thirds with liquid. The source of this fluid and gas I have demonstrated conclusively by the following experiment to be transudation and decomposition.

Experiment 4.—A dog, weight forty pounds; aseptic laparotomy; six inches of small intestine drawn out, mesenteric vessels supplying six inches of the intestines ligated with silk; segment completely emptied; lumen of bowel closed above and below this portion, precaution being taken to pass the ligature between the muscle wall of the intestine and the parallel vessel, allowing the latter to be free. Examination forty-eight hours after showed the coil very much distended, the wall edematous, slightly discolored over a small area about the size of a nickel on the convex side of the center of the segment. Caliber of bowel about two-thirds full of fluid and one-third gas. This experiment was tried three times, each time with the same result, which demonstrated that the gas was generated within the segment, and that the fluid was a transudate. The same result was obtained, except the quantity of transudation was less when the mesenteric vessels were not ligated, but the intestine itself ligated. Quite another result was obtained when the mesenteric vessels were ligated and the intestine, including the parallel vessel, was closed, as shown by experiment 3.

In the latter experiment after twelve hours there was but a very small quantity of gas and still less fluid in the coil; it was dark and gangrenous. In less than forty-eight hours with these same ligatures the segment was entirely disintegrated. This shows: 1, that the nutrition of the intestine in strangulation is kept up for a longer time by the parallel vessel; 2, that the gas in the strangulated loop is generated within the coil; 3, that the fluid within the coil does not enter from above nor from below, but is a transudation from the mucous membrane and continues as long as the blood supply from the parallel artery remains, as this artery has no accompanying vein; 4, when the strangulation is rapid and complete, as in Littre hernia, there is no transudation into the coil and but slight generation of gas.

The shape and position of the distended coils will be found to be of great service in making accurate diagnosis of the location of the strangulation. The inability to produce bowel movement is due either to mechanical obstruction or paralysis, the latter may be local, reflex or of central origin. Its phases will be considered in the analysis of the various groups.

Of the constitutional symptoms, one deserving particular attention is the excretion in the urine of phenol and indican. They are the products of absorption of decomposed proteids from the intestinal tract. The indican is present in occlusions of the ileum and absent in obstructions of the large intestine. Albuminuria is very commonly present in intestinal obstruction. In making differential diagnosis the symptoms should be carefully considered in the order of their onset, in the comparative degree of their intensity, the location of their most pronounced manifestations, their continuous or interrupted course, and their relations to physical signs at the various stages of their progress.

Next in importance is a careful physical examination. Inspection, palpation, percussion and auscultation should be practiced systematically in every case of intestinal obstruction, as they have a very positive value in assisting us in making a diagnosis. By these, in intestinal lesions, we recognize the changes in form, in resistance, position and movement of the intestinal coils.

We will now consider the particular forms of ileus.

First. Ileus from paralysis following extensive operations on the mesentery can be at once recognized by the operator and managed better from a prophylactic standpoint than from any other, that is, by a resection of the portion of the bowel where the circulation has been compromised at the time of the operation.

Second. Paralysis from long standing strangulation, I will mention when considering hernia.

Third. Embolism of the mesenteric artery has no pathognomonic train of symptoms or signs, but the history of previous sepsis aids very much in leading to a diagnosis of this rare condition.

Fourth. Paralysis of the intestine from injuries to the spinal cord is readily recognized.

Fifth. Injuries to the afferent nerve supply from direct contusion or from bullet or stab wounds produce ileus where the abdomen has not been involved by the traumatism directly; this variety is usually accompanied by retention of urine, while in perforation of the viscera this symptom is not present. Reflex ileus from renal calculus is recognized by the spasmodic character of the pain, its location in the loin and course of the ureter, its intensity, its reflex on the bladder and testicle, its duration, the position of tenderness, the progressive change of its location and the information obtained from an examination of the urine. The same symptoms are of value in recognizing periodical hydronephrosis.

In hepatic calculus there is greater difficulty in making a differential diagnosis. First, when the gall stone is still within the gall bladder, the pain gradually increases and reaches its greatest intensity about an hour after the onset; it continues for a few hours and subsides to return again in a short time. It is commonly designated by the doctor and patient as "gastralgia"; the bowels can be moved as a rule within a few hours after the attack begins, and there is always local tenderness in the region of the gall bladder. If a mild cholecystitis be present, there is slight elevation of temperature to $99\frac{1}{2}^{\circ}$ or 100° . The pain often subsides suddenly after a severe effort of vomiting. The patient usually gives a history of having had repeated attacks of the same character. The tenderness remains for two or three days after the attack, depending upon its severity. The following case is a good illustration:

K. P., female, age 32 years. For several years has had several attacks of the following character: First, a sense of full-

ness and discomfort in the right hypochondriac region; within fifteen or twenty minutes this increased to pain, in one-half an hour the pain was severe and nausea set in. This was succeeded in from thirty to forty minutes by vomiting. If the vomiting was mild the pain would continue; if severe, it would subside. The temperature usually reached 100 degrees; slight tympanites. The patient believing that the attacks were due to biliousness, resorted to cathartics for relief. It always required large and repeated doses to produce an evacuation when pain was present, while under ordinary circumstances a mild cathartic acted freely. Tenderness was present and increased resistance over area of the gall bladder, and when all the symptoms would abate a small tumor could be detected over, but separated from the kidney. Tenderness would increase for three or four days after the attack had subsided, according to its intensity. Albumin in the urine. Patient had never been jaundiced. Diagnosis: Cholelithiasis; impaction of the gall bladder; operation, cholecystostomy; gall bladder enlarged; neck impacted with large gall stones; recovery; cessation of symptoms. The above symptoms contrast markedly with the symptoms of cystic duct impaction, as is illustrated by the following case, which is typical of its kind:

Mrs. Z., aged 36 years, married, six children; excellent health up to 22 years of age. At that time she had a short attack of severe epigastric pain and vomiting. From that time on she had suffered from digestive disturbances and tenderness in the right hypochondriac region. Four years ago she had a similar seizure of longer duration, and during it there was inability to move the bowels. Henceforth the seizures returned every five or six weeks, and for the last five months the pain and tenderness in the hypochondriac region had been constant, with periodic exacerbations. Patient had never been jaundiced. Examination during an attack revealed tenderness in the right hypochondriac region; induration; tympanites, temperature 100 degrees. Diagnosis: Cholelithiasis; impaction of cystic duct. Operation cholecystenterostomy by means of an anastomosis button; gall bladder packed with gall stones; a dozen or more were removed and many allowed to remain; recovery; cessation of symptoms.

When the common duct is obstructed the onset is more sudden, the pain more intense, always accompanied by bile in the urine, often jaundice, depending upon the duration of the obstruction and other symptoms well recognized and familiar to all physicians.

A third variety of reflex ileus is that produced by compression of an ovary, as by fibroids; it may be

recognized by the history of the case and the location of the pain, which can be lessened or increased by certain movements of the fibroid and frequently relieved by changing the fibroid from its impacted position.

Dynamic Ileus.—Dynamic ileus or ileus from spasmodic contraction of the muscular wall occurs, first, from ptomaine intoxication, as that obtained from cheese, milk, ice-cream, oysters, etc., and second, from chronic lead poisoning. In the former the pain is intense and often relieved by pressure. The vomiting is incessant; tenderness absent; abdomen retracted; inability to move the bowels; patient collapsed; these symptoms may continue until death, which occurs from toxemia. If the patient survives the immediate effect of the poison, it is usually followed by severe gastro-enteritis.

In making a diagnosis of lead poisoning we have to assist us the occupation of the patient, the history of previous attacks, the blue line of the gums, etc.; but the increased peristalsis, the local meteorismus, the distinct localization of the pain, make it difficult to exclude mechanical obstruction, as the following case illustrates.

Male, aged 40 years; admitted to the Alexian Brothers' Hospital June 10, 1894, and referred to me for operation by the attending physician. Patient gave the following history: Five days previous was attacked with pain of a spasmodic character in the abdomen, followed by vomiting and inability to move the bowels. The abdomen became greatly distended and the symptoms continued up to the time of admission. All efforts to move the bowels by cathartics, stomach and intestinal irrigation were futile. The physician in charge, who had treated him through a number of attacks of lead colic before, believed this attack differed materially from the others, particularly in its duration, which was five days, and the degree of depression. The physical signs showed the abdomen decidedly tympanitic, and an enlarged coil of intestine could be recognized leading up to the right hypochondriac region, where it suddenly terminated. The patient located the pain at this point. It was decided that a laparotomy would be less dangerous than to allow the patient to remain longer with a possible mechanical obstruction. Median incision; omentum withdrawn, and the

hand passed up to the right hypochondriac region, the enlarged coil of intestine was grasped, drawn into the wound; with it came eight inches of a contracted portion, which resembled a solid cord three-eighths of an inch in diameter and was as stiff as a rope of that size. (See Fig. VI.)

At first I believed it to be an organic stricture. The intestine above it measured over two and one-half inches in diameter and was distended with gas and fluid feces. Below, the intestine was empty, soft and pliable. After ten minutes' exposure to the air the spasm at the proximal end began to subside and dilatation gradually advanced to the distal. After twenty minutes the intestine had expanded to about one inch in diameter, was returned and the abdomen closed. The bowels moved



Fig. VII

within three hours. The patient did not have an unpleasant symptom and left the hospital in ten days. The theory of lead colic advanced, has been that it was due to a tonic contraction of the muscle of the bowel; but from a superficial review of the literature on the subject, I can not find a case recorded where this theory was verified by observation and examination of the contracted portion as I have noted in this case.

Infection ileus. Ileus from peritonitis occurs under two conditions, namely, that from a circumscribed local inflammation, and from a general peritoneal infection. In ileus from circumscribed inflammation

we have the symptoms so commonly observed in circumscribed suppuration at the seat of the appendix. The pain occurs suddenly and may be either local, referred or general, but is most severe at one point. The nausea and vomiting are of short duration, usually not more than one-half hour, and within six or eight hours there is elevation of temperature to 100 degrees, or more, and not infrequently a chill. The information obtained from the pulse is of little significance. Marked resistance of the abdominal muscles and tenderness is present over the seat of inflammation. On the other side of the abdomen the hand can be pressed in without causing pain or inducing resistance. The tympanites is limited. The apparent induration is circumscribed; the deep percussion note is resonant in the early stage. The piano percussion note is flat, and this method of percussion I consider the most important in eliciting dullness when small inflammatory exudates are present. The smallest quantity of fibro-purulent or serous exudate can be outlined by the latter method. Auscultation shows an absence of peristalsis over the region of inflammation, with peristalsis moderately active over the remaining portion of the abdomen. In making a careful examination with the stethoscope and the use of an indelible pencil, it is interesting to note how perfectly the area of adhesion and exudation can be outlined by the absence of peristalsis and subsequently proven in the operation. The symptoms of ileus pass off with these local inflammations in from twenty-four to forty-eight hours, when a free bowel movement can be produced by the use of cathartics. These same symptoms only less pronounced, occur with circumscribed adhesive peritonitis from cholecystitis and tubal infection, and in each case can be differentiated by its location and history.

Note what a great contrast this is to the ileus of general peritonitis. In this variety the pain is intense and extends all over the abdomen; the nausea.

and vomiting are persistent for days; the temperature elevated to above 100 degrees except in the presence of collapse; the pulse frequent, small and thready; the skin cold; the countenance depressed; anxious expression; enormous and uniform meteorismus; absence of respiratory movements in the abdomen; knees flexed. On palpation resistance is greatest over seat of origin; muscles are firmly contracted; deep percussion note uniformly resonant; piano percussion note dull over area of adhesion and exudation; complete absence of peristalsis. An uniform splashing sound with each respiration, caused by motion of fluid in bowel must not be mistaken for peristalsis. In this the sound is uniform with every respiration; in peristalsis it varies constantly. It is impossible to induce a bowel movement; the obstruction is as complete as if the intestines were ligated, and remain so until a few hours before death, when relaxation takes place. To the inexperienced this is considered an indication of relief of the "obstruction," but it is really a sign of impending dissolution. The cause of the ileus in these cases is a peripheral paralysis.

What should our treatment be in cases of ileus from circumscribed and general peritonitis? It should be immediate laparotomy. By this means in cases of circumscribed peritonitis the cause may be eliminated and the inflammation prevented from becoming general, not that all cases would die immediately as a result of the disease, but that the immediate and remote dangers without operation are very much greater than with operation. In general peritonitis the danger is great both with and without operation, but it is my firm conviction that an early operation, that is an operation within twelve or twenty-four hours after the onset of the symptoms, will save a large percentage of the cases. An operation in the late stage, when the patient has cold extremities, is pulseless at the wrist and dissolution is imminent, should be discouraged, as it does no good

for the patient and brings discredit on surgery. The importance of early operation in general peritonitis is illustrated in the two following cases:

Case 1. Referred to me by Dr. James G. Berry. G. F., aged 19, weight 220 pounds. On the morning of Sept. 8, after breakfast, he was attacked with severe pain in the abdomen. This was shortly followed by vomiting. The pain and discomfort were sufficient to compel the patient to remain in the house, but not in bed. On the following morning at 10 o'clock, twenty-six hours after the onset of pain, he walked a couple of blocks and consulted a druggist as to his condition. He was advised to see a doctor. About 3 o'clock he was seen by Dr. Berry, when a diagnosis of appendicitis was made. At 4 o'clock his condition was as follows: Pulse 140; temperature 102°; tympanites excessive; tenderness most marked on deep pressure over appendix; peristalsis absent; inability to produce bowel movement; patient's facial expression good. He expressed himself as feeling tolerably comfortable. Respiratory movements of the abdomen absent; deep percussion note resonant; superficial dullness over the entire abdomen. Immediate laparotomy. The abdomen was opened, two inches to the right of the median line parallel to the external border of the rectus. On opening the peritoneum, a sero-purulent fluid escaped. There were no adhesions. Pus was found in all directions, a large quantity of it being in the pelvis. The cause of the peritonitis was found to be a pressure atrophy of the appendix with perforation. There were no adhesions around the appendix; no gangrene of the mucous membrane. The peritonitis was produced by a direct perforation of the appendix from pressure from a calculus. The pus was sponged out, drainage glass tube and gauze. Normal gloss of the intestine was not disturbed in the least by the presence of pus; the surface was not even red. The patient made an uninterrupted recovery.

Case 2. Referred to me by Dr. D. R. Connell, Oct. 21, 1894. B. P., female, aged 21. Ten o'clock on the night of Oct. 20, the patient experienced severe pain in the abdomen, followed by nausea and vomiting, great tenderness and a temperature of 100.6 degrees. Diagnosis appendicitis. Operation thirty-six hours after the onset of symptoms. At the time of operation the abdomen was uniformly distended and tender, absence of peristalsis, inability to produce bowel movement, patient still vomiting, pulse 120, and temperature 100.5 degrees. Deep percussion note resonant; superficial (piano) percussion note on the lower part of abdomen dull, on the upper resonant. Celiotomy. No adhesions of peritoneum; the coils of intestine in all directions were covered with pus. Half a pint of pus was found in the cul-du-sac of Douglas. Intestines not eroded, slightly congested, still glistening; appendix adherent; a few flakes of

lymph on its surface; an ulcer of the mucous membrane, but no perforation present. The source of infection was evidently the appendix, infection traveling through the wall at the seat of the ulcer or by the lymphatics. The pus was sponged out, no irrigation, glass and gauze drains in all directions. Rapid recovery.

The result in these two cases shows what can be accomplished in early operation for suppurative peritonitis; but this favorable outcome must not be expected from the dry, ecchymotic, excoriated peritonitis from streptococcus infection.

Cases of adynamic ileus have only recently been brought to the attention of the surgeon, but from the illustrations of the varieties given it will be seen that there is a fertile field for intelligent surgical interference, based on accurate diagnosis.

Mechanic ileus.—In the diagnosis of internal strangulation, no matter from what cause, we have exactly the same symptoms as in strangulated hernia, except the physical signs are different. The symptoms of internal strangulation are as follows: Pain in the abdomen which comes on suddenly, gradually increasing in intensity for the first half hour, followed by nausea and vomiting, and inability to produce bowel movement. If the strangulation be severe, there is an increase in the frequency of the pulse (but as a rule in the early stage the pulse is not accelerated), *absence of temperature*, absence of tenderness. As the case advances, if the strangulated coil be large, it can be recognized through a moderately thin abdominal wall by its distension; the coil of the intestine leading to it may also be recognized by a circumscribed elevation of the abdominal wall. In twenty-four hours all of these symptoms will have increased in severity. The distention of the coil is greater, the abdomen is more tympanitic, sensitiveness at the seat of obstruction is now manifest, and the increased resistance of the occluded coil may be felt. If the coil be small, the increased resistance of the intestine on the proximal side of the occlusion may be felt and a circumscribed dullness be outlined. This varies with

position, depending upon the portion of the intestine involved in the strangulation, as shown in the von Zoega-Manteuffel plates. *Peristalsis is very greatly increased and is most pronounced in the neighborhood of the obstruction.* This increase in peristalsis continues until *peritonitis* sets in, when it entirely disappears. If the strangulation be sufficient to produce gangrene the depression will be more marked, but the local manifestations unchanged. *Opiates paralyze peristalsis for hours and therefore should never be given in acute intestinal lesions as they obscure the symptoms and signs of the pathologic process.*

The following cases are good illustrations of internal intestinal strangulation :

Mr. C., aged 37 years, robust, had always enjoyed excellent health. Six days before admission to the hospital was attacked with pain in the abdomen, moderately severe, followed by nausea, persistent vomiting, and inability to produce bowel movement. The symptoms continued notwithstanding intestinal irrigation and frequent doses of cathartics. When admitted the pulse was 100; temperature 99 degrees, and it had not exceeded that at any time since the onset. Expression good; abdomen very tympanitic, greatest distention being just above the umbilicus. Increased resistance in neighborhood of umbilicus; abdomen slightly sensitive. Diagnosis intestinal obstruction. Laparotomy. A loop of bowel was found twisted around a Littré diverticulum attached to the umbilicus, evidently congenital. The coil was distended, cyanotic, surface glistening but not gangrenous. There was no peritonitis. The diverticulum was ligated, excised and invaginated, the coil liberated; circulation became reestablished, and the abdomen closed. Time occupied in the operation twenty-five minutes. The patient's pulse increased in rapidity, the vomiting subsided, the bowels moved freely, nevertheless, he died nine hours after the operation. Post-mortem showed no peritonitis; strangulated portion of the intestine congested but not perforated; mucous membrane ecchymotic; small veins thrombosed.

What was the cause of death? It was certainly not the strangulation, nor peritonitis, but auto-infection either from absorption of the decomposed proteids that began rapidly after the liberation of the obstruction, or an auto-infection through the thrombosed intestinal veins, more likely the former, as we

have exactly the same results where the gangrenous intestine and infected veins have been resected.

Case of internal strangulation in a sub-peritoneal pocket at left internal inguinal opening;

Mr. C., age 22 years; printer. On the morning of October 25, when lifting a heavy case, "felt something give way" in the left inguinal region. The pain became so severe he was compelled to stop work and go to bed. Six hours after the onset vomiting began and continued at frequent intervals up to the time of operation. Impossibility to produce bowel movement. I saw him three days after the onset of symptoms. *Status presens*: Face sunken, eyes prominent, anxious, depressed expression; pulse 90, temperature 98.8 degrees; breathing somewhat labored. Abdomen tympanitic, most prominent in lower left portion; resonance irregular; sensitive over left inguinal ring; a slight induration could be felt above and to the left of the internal ring. The inguinal canal was free, the finger could be passed through it. Peristalsis was greatly increased; rectal examination negative. The patient located the difficulty in the left inguinal region.

Diagnosis: Internal mechanic ileus. Section; median incision; passed the hand down to left internal ring, found the coil bound fast at the ring. Exposed the parts and found a peritoneal pocket extending upward and to the left subperitoneal, *i. e.*, between the parietal peritoneum and the muscular fascia. Incised the constricting ring and opened pocket; bowel in good condition; not resected. Peritoneal sac removed and opening sutured. Abdomen closed. Rapid recovery.

Case of strangulated diaphragmatic hernia. Referred to me by Dr. Richard Haley:

J. H. M., age 31 years; single. Admitted to Mercy Hospital July 15, 1895. The patient, a well-developed, muscular brakeman in excellent physical condition, states that he has had repeated attacks of abdominal pain and vomiting with inability to produce bowel movement in the last six years, usually lasting from ten to twelve hours; had never had a severe injury. The pain was always located in left hypochondrium. Present attack began six days ago with the usual symptoms, slight pain in left hypochondrium; vomiting, not excessive, biliary in character; no passage from bowels of gas nor feces from that time. *Status presens*: Patient's expression good; pulse 86, temperature 98.7 degrees; breathing somewhat labored; abdomen very much distended. Borborygmus so marked that it could be heard in any part of the room; pain not severe; tenderness most marked in left hypochondrium, but nowhere excessive; auscultation revealed increased peristalsis, most marked in right hypochondrium, but present in all portions of

abdomen; percussion elicited areas of dullness over lower half of abdomen, largest to right and below umbilicus; they were outlined with ink on the surface of the abdomen and changed position while being transferred to the hospital where he was re-examined. The transverse and ascending colon could be outlined by inspection and percussion. They were greatly distended. Section: median incision; small quantity of serum escaped. The sigmoid flexure found contracted and empty; followed it up to large bowel and the latter to splenic flexure, which could not be drawn into the field. Small intestine was very much distended with fluid feces. The colon ascendens and transverse enormously distended with gas, but contained no feces. The greater portion of the bowel had to be turned out to allow access to the obstructed splenic flexure of the colon. A careful examination showed the cause of the obstruction to be a strangulated diaphragmatic hernia; the opening was situated two inches from the ribs and about the junction of the posterior with the middle third of left leaflet; it was most difficult to reach. Traction failed to move the strangulated portion. With the greatest difficulty the tip of the finger was inserted under the edge of the ring, which was divided on the finger with scissors. The intestine was liberated and examined; the circulation was rapidly restored; no resection necessary. The intestines were removed from the warm protections and returned by the "towel method" of reduction, which I have used on many similar occasions and found very effective. Abdomen closed. The sphincter ani was then paralyzed by over-stretching.

In the operation the patient had excessive and true fecal vomiting. This was accounted for by the obstruction being so far down in the large intestine. Patient's condition fair when the operation was completed. Had copious and frequent bowel movements three hours after operation. Soon showed severe symptoms of shock; pulse rapidly increased in frequency; in seventeen hours it had reached 142; temperature 105.2 degrees. Hippocratic face with marked excitement and anxious mental state. This condition continued until death, which occurred forty-three hours after operation. Post-mortem was not permitted.

Volvulus is a rare form of internal ileus. By volvulus we mean a twisting of the intestine upon itself for more than two-fifths of a circle; less than this does not produce obstruction. We have all the symptoms of ileus; the pain is mild; the vomiting is persistent; inability to produce bowel movement; absence of temperature. In the early stage the patient shows very little depression; pulse nega-

tive. As soon as the coil of the volvulus becomes distended, it can be recognized by its shape through a moderately thin abdominal wall; the local meteorismus; increased resistance local; great increase of peristalsis until peritonitis supervenes. The following case, referred to me by Dr. J. L. Piper, is typical:

Mr. S., aged 68. Nov. 10, 1893, was seized with pain in the abdomen shortly followed by vomiting, inability to produce bowel movement; slight tenderness; diagnosis by Dr. Piper, intestinal obstruction. I saw him thirty hours after the onset of symptoms; he then had but little pain; the vomit-



ing was frequent and severe, the matters ejected yellow and offensive; pulse 72; temperature normal; abdomen distended, most prominent a little below and to the right of umbilicus; increased resistance at this point; tympanitic; excess of indican in urine. Patient removed to Presbyterian Hospital. Celiotomy. The hand was passed down to the right and the distended coil drawn into the opening. The distended intestine measured over two and a half inches in diameter; a coil of 12'' was found twisted upon itself; when this was straightened a loud report was heard from the escape of gas; there was no gangrene

nor peritonitis; intestine returned. Patient made an excellent recovery.

Frequent in the benign mechanical obstructions is cicatricial contraction of the intestine itself. In these cases the onset is gradual, so much so that the patient suffers from intestinal disturbance a long time before the final occlusion takes place. This occlusion frequently manifests itself as a seizure with pain, nausea, vomiting, no elevation of temperature, no change in pulse, inability to produce bowel movement. Note following case:

Mrs. E. T. S., aged 53, referred to me by Dr. Jas. J. Fortier. The patient, three days previous, was suddenly attacked by pain in abdomen, persistent vomiting, inability to move bowels. These symptoms continued until time of operation. When patient entered Post-graduate Hospital she still complained of pain; slight tenderness. A hard tumor the size of a child's head could be felt just above the symphysis; abdomen tympanitic, slightly tender, greatest resistance on the left side of tumor; percussion note except over tumor resonant; pulse 96, temperature normal. Diagnosis, dermoid cyst; intestinal obstruction, probably from bands. The patient stated positively that the tumor was not present until the attack came on, but this was not credited. Laparotomy June 2, 1893. Median incision; dermoid removed; distended coil of intestine drawn out and with it a stricture, a cicatricial band completely occluding the bowel for one inch; resection of two inches of bowel and end-to-end approximation with button. Time for making resection five and a half minutes. Time for entire operation—removing dermoid, making resection, and complete closure of abdomen, nineteen minutes. No drainage. Convalescence uneventful; button voided on the tenth day. July, 1894, patient in excellent health.

Invagination (intussusception) occurs more frequently in children than in adults. The onset is sudden; the patient usually gives a piercing shriek

from pain in the abdomen; depression produced is very great; the pulse increases rapidly in frequency; the vomiting is persistent; the eyes sunken; cold perspiration. These symptoms continue for about two hours, when they gradually diminish. The vomiting persists, but is less severe; after twenty-four hours blood may be detected in the stools. The following case was referred to me by Dr. F. S. Hartmann: Baby. B., aged 7 months, shortly after nursing gave a loud and piercing cry and began to vomit; cold perspiration and collapse. When seen by Dr. Hartmann a few hours later, pain was less severe; a distinct oblong tumor could be found in the right hypochondriac region just below the margin of the ribs; no bowel movement could be produced. The same afternoon the patient was removed to Cook County Hospital. Laparotomy ten hours after onset of symptoms. Tumor in right hypochondriac region was very distinct; median incision; tumor grasped with the fingers and found to be the cecum and colon into which the ileum was invaginated. Very friable adhesions had formed, but pressure upon the colon forced the ileum out without traction. Abdomen closed; perfect recovery; patient left hospital after seven days.

When the obstruction is due to a gall-stone or a foreign body in the intestine, the symptom of vomiting is very marked, the meteorismus is less and the depression less, as the foreign body is constantly changing its position and advances further in the intestinal canal.

The following case illustrates intestinal obstruction from enterolith:

Case 1.—J. McC., age 47; male; admitted to Cook County Hospital Dec. 1, 1895. Family history negative. Personal history: Uses intoxicants and tobacco to excess; had gonorrhea three times; denies syphilis; typhoid fever when a boy; about twenty years ago was seized with sudden severe pain in the epigastrium; he describes the pain as a cramp, says it lasted but a few hours; since that time has had many similar attacks; present illness began five days ago; after a large

bowel movement, was seized with severe, steady, aching pain in the epigastrium which confined him to bed; the following evening patient began to vomit a dark-colored material; shortly after the material ejected became offensive; the severe pain, vomiting and inability to produce bowel movement has continued up to the present.

Physical examination: Well nourished; conjunctiva slightly jaundiced; tongue dry and heavily coated; breath very offensive; face has a pinched expression; knees drawn up; abdomen distended; irregular elevations can be noticed on its surface; liver dullness normal; the peristaltic movement could be recognized through the abdominal wall; auscultation revealed stormy peristaltic action, most marked in the epigastrium and on the right side; no tenderness except to the left and a little above the umbilicus, where deep pressure produced pain. Pulse 90; temperature normal.

Diagnosis: Mechanic ileus without intestinal strangulation. Celiotomy Dec. 6, 1895. Assisted by Drs. Besley and Wood. Median incision; small intestine very much distended; a portion secured and held by assistant; splenic flexure of colon located; found contracted and empty; advanced along the transverse colon until near the median line, when a nodule was felt in the small intestine. The transverse colon was then dropped and the nodule in the small intestine drawn into the wound. The intestine above the nodule was about two inches in diameter, below the nodule five-eighths of an inch. It could readily be seen that the obstruction was produced by a large foreign body in the bowel. A parallel incision was made and a large enterolith extracted. Opening closed with a Czerny-Lembert suture. Abdominal wound closed with silk-worm gut; no drain.

The enterolith weighed 25 grams. It measured $4\frac{1}{2}$ cm. longest diameter by 2.75 cm. shortest. Its circumference was 12 cm. The center appeared to be made up of an old dry mass of plum pudding, to which other material had become adherent. It would be interesting to know whether this had been the cause of the attacks of pain which he had had for twenty years preceding the operation, and if it had been in the canal where it was lodged. We do know that the anastomosis button may remain in the bowel for months without producing manifestations of its presence. The differential diagnosis between strangulation ileus and obturation ileus in this case was based on the fact that the man had suffered for five days from obstruction and still was not collapsed nor severely depressed by it. The patient made an uninterrupted recovery.

We have in strangulated hernia the same symptoms as in internal strangulation, and in addition thereto we have a history of hernia, and the presence of an

irreducible tumor. The peristalsis is increased and there is an absence of induration in the abdomen, except where peritonitis is present. When peritonitis is present there is a marked induration about the seat of obstruction and an absence of peristalsis in that region.

The following cases are illustrative :

Case 1.—Mr. C., aged 58. Referred to me by Dr. T. A. Lilly. Gave a history of hernia of twelve years' standing. Twenty-four hours before he came under my observation the hernia was down, and at that time he received a kick in the scrotum. It was followed by pain; the patient continued his work as usual, but at night was unable to return the hernia as had been his custom. He remained in bed the next day, and sent for the doctor in the afternoon. An irreducible strangulated hernia was detected and the case referred to me. Patient's pulse 100; temperature 100.3 degrees; abdomen tympanitic, induration extending over an area of five inches from the inguinal canal; absence of peristalsis over that region. No effort made at reduction and patient would not consent to operation at that time; but the following day he was taken to hospital. Herniotomy performed. On opening the hernial sac there were found two perforations of the coil of intestine, evidently the result of the traumatism. The coil was surrounded by pus; circulation not strangulated. Abdomen opened, and suppuration was found to extend about six inches from the inguinal opening. Intestines matted together, a large pocket of pus in the neighborhood of the inguinal canal, and three or four feet of the intestine covered with a pyo-fibrinous exudate. Peritoneum cleansed, pus carefully removed from surface of intestines, perforations sutured, coil returned, position of sutures kept at opening in the abdomen, the latter packed with gauze, glass drain inserted. Patient's condition was excellent for fifteen hours; his bowels moved; he then began to sink rapidly, and died twenty hours after operation. Post-mortem not permitted.

Case 2.—Referred to me by Drs. Jennings and Berry. History of strangulated hernia. Three days previous the hernia came down and could not be reduced. The pain was more severe than at any previous time. The patient had made protracted efforts at its reduction, but did not succeed. A doctor was consulted and the hernia apparently reduced, but the pain, vomiting, and inability to produce bowel movement continued.

Examination three days after onset of symptoms showed the abdomen uniformly distended; absence of abdominal respiratory movement; induration circumscribed by an arc of five inches from the inguinal ring; peristalsis over that area absent; present on the other side of the abdomen; temperature 101 degrees. Diagnosis, strangulated hernia; perforative peritoni-

tis. Operation. Sac opened, and found to contain a small knuckle of intestine not strangulated, feces and pus. An opening half an inch in length was found in the coil of intestine, not from gangrene, but cut apparently by pressure against the ring in the patient's efforts at reduction. Enlarged opening in abdomen. Peritonitis circumscribed, half a pint of pus in the iliac fossa, twenty inches of intestine covered with a fibro-

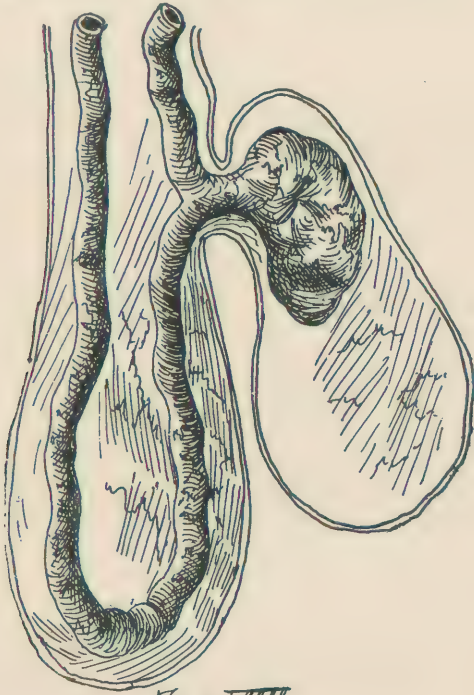


Fig. VIII

purulent exudate. Peritoneum cleansed, sac amputated, opening in bowel sutured (Czerny-Lembert), and retained near wound in the abdomen. Packed with iodoform gauze, glass and gauze drains. The following day the patient's condition was fair and continued so until the third day, when singultus began. This persisted for four days, the patient vomiting once every six or eight hours. A bowel movement was produced on

the second day and frequent passages kept up from that time. In ten days the gauze drain was removed, and the patient made a slow but perfect convalescence.

These two cases illustrate the characteristic signs of infective peritonitis following strangulated hernia; that is, beside the usual symptoms of obstruction there was *elevation of temperature*; *absence of peristalsis* near the position of obstruction, and *induration*. In neither of them was the coil of intestine gangrenous, and therefore not resected but sutured. It was fortunate for the patient in both cases that the hernia could not be completely reduced.

Strangulation of the omentum produces usually the same symptoms as an intestinal obstruction, and they continue for three or four days, depending upon the degree of strangulation. If it be sufficient to produce a necrosis they will continue until gangrene is complete. This may occur without producing a suppurative peritonitis, nor even an infection of the sac and absorption may take place. It is not uncommon, however, to have an incarcerated or strangulated omentum suppurate, and it should not be reduced. The same practice should govern its reduction, as the reduction of a strangulated intestinal hernia, that is, a hernia of more than thirty-six hours duration should never be reduced except by operation where the coil can be examined.

The following is an illustration of the importance of this principle in omental strangulation:

Mr. R., referred to me by Dr. W. W. Wetherla, and admitted to St. Joseph's Hospital. The patient stated that in alighting from his buggy forty-eight hours before, his hernia came down, as it had done repeatedly for fifteen years. He could not reduce it. The doctor was called thirty-six hours after the obstruction occurred and finding that the hernia could not be reduced, advised operation. Herniotomy was performed forty-eight hours after the onset of symptoms. The strangulated omentum was suppurating, and infiltrated with a fibropurulent exudate; fresh adhesions to sac evidently prevented the reduction. Omentum amputated; stump returned, and Bassini operation resorted to for radical cure; sac removed, abdomen closed, complete primary union notwithstanding the

presence in his perineum and scrotum of a number of old suppurating fistulæ. I believe that the source of the infection was through the lymphatics from the perineum and scrotum. In this case, as in the two preceding ones, the hernia could not be reduced.

Another danger following reduction of hernia is

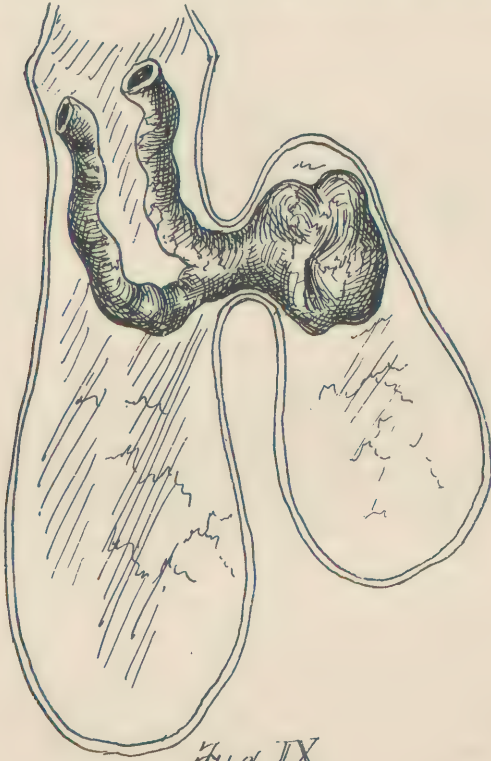


Fig IX

that it may be reduced *en bloc*, or a small knuckle may be allowed to remain in the ring. In these cases the symptoms of obstruction do not subside after the reduction, and it should be the rule that in all cases

of reduced hernia, where the symptom of vomiting continues for six hours after reduction, a laparotomy should be performed.

Mrs. K. Referred to me by Dr. Blank. Patient had a strangulated umbilical hernia of two days' duration when the doctor saw her. It was returned; the symptoms of vomiting continued, and the patient's abdomen became more and more distended. No bowel movement could be produced. The vomit had the peculiar odor of decomposed intestinal contents, not fecal. The patient's countenance denoted great depression. I saw her five days after the initial symptoms; at which time the extremities were cold, a cold perspiration over the entire body; lips cyanotic; eyes staring and glassy, and the patient in the most profound collapse. Examination of umbilicus showed the opening free, but on passing the finger into the ring an indurated nodule could be felt on the right side. No operation. Patient died two hours later. Post-mortem showed small knuckle of strangulated gangrenous bowel in one of the pockets of the sac, so commonly found in umbilical hernia.

As an illustration of incomplete reduction, the following is a most instructive case, referred to me by Dr. John W. Hanna of Winfield, Iowa.

Patient admitted to St. Joseph's Hospital, December 30, 1894. Six days previous, when he alighted from his buggy, the hernia came down. It was more painful than usual. It was reduced a short time after, but the pain continued, and he soon began to vomit. When seen by Dr. Hanna, five days after the hernia came down, the patient's abdomen was tympanitic, the vomiting had continued; the pain was slight, and in the five days the bowels had not moved. Examination revealed the inguinal canal apparently free. The patient presented the same symptoms when he came under my observation in the hospital, except that a small, hard nodule could be detected on the inner side of the right inguinal ring. The finger could pass freely into the canal without obstruction. This nodule was sensitive to pressure and very hard. The scrotum was full of fluid, as the patient said, from an old hydrocele.

Operation. Hernial sac opened, found empty, incision extended up into abdomen, and just below the inner pillar at the induration was found a knuckle of intestine passing from the seat of hernial sac through a very narrow opening into the hydrocele sac, as shown in Figs. 8 and 9. The abdomen contained a considerable quantity of serous fluid. Before the hydrocele sac was opened, the field was well packed with gauze and preparations made for a resection of the bowel. Hydrocele sac opened, contained a Litre hernia, involving four-fifths of the circum-

ference of the bowel; it was gangrenous and perforated, and the hydrocele sac was full of very offensive pus and feces. Resection of five inches, end-to-end approximation with button, and mass returned into abdomen. Peritoneal cavity full of seropurulent fluid; incision left open and packed with gauze. Patient's condition when removed from the operating table very good. Within the next eight hours after operation he had six bowel movements, but his pulse began to increase. He had no pain, tenderness, tympanites nor vomiting. His expression became anxious and he died thirty hours after the operation from auto-intoxication.

We have in this case a striking illustration of the importance of operating where the symptoms of vomiting continue after the reduction of the hernia. Furthermore, we have an additional illustration of death from auto-intoxication from the absorption of the decomposed proteids that have been retained in the intestinal canal. In this case it could not be attributed to the thrombosed veins as they were resected.

TOWEL METHOD OF REPLACEMENT.

Surgeons of experience well know how difficult it is to replace the bowels after they have been out for a considerable time during an operation even when protected by hot applications. The causes of this difficulty are: 1. Usually before the operation the bowels are full of gas (tympanitic) from the diseased condition demanding the operation. 2. During the exposure the intestinal wall becomes edematous and a large transudation of fluid into the intestinal canal takes place. The bowel when eviscerated is light and its wall thin and pliable, in half an hour it becomes heavy and sodden, resembling sausage. These changes make it difficult to replace the intestine into the abdominal cavity. Some operators resort to puncture of the bowel to relieve the distention and thus facilitate the replacement. In a number of cases I have used the following method of returning the bowel. Cover the entire intestinal mass with a hot towel, placing the edge of the towel inside the margin of the wound all the way around. This acts as an artificial

abdominal wall and resembles an enormous ventral hernia with a large neck or opening. The operator and assistant then press or work the edge of the towel under the wall on all sides, with the fingers, at the same time elevating the abdominal wall with retractors, and thus force the mass down to a level with the abdomen. The reduction is effected in this manner as easily as a hernia is reduced after the ring has been enlarged. The sutures are then inserted and as they are tied the towel is gradually withdrawn.

I desire to thank Dr. F. S. Hartman for his assistance in the preparation of this article.

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